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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,109	11/12/2003	Gary F. Shade	INT-19	6494
32509	7590	07/28/2005	EXAMINER	
CARRIE A. BOONE, P.C.			CRUZ, MAGDA	
2450 LOUISIANA			ART UNIT	
SUITE 400-310			PAPER NUMBER	
HOUSTON, TX 77006			2851	

DATE MAILED: 07/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/706,109

Applicant(s)

SHADE, GARY F.

Examiner

Magda Cruz

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-17 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-13 and 18-23 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/12/2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "ray-forming device further comprising transparent surfaces and reflective surfaces, in which the transparent surfaces are alternately disposed adjacent to the reflective surfaces in a checkerboard-like arrangement" (claim 8) and a "third micromirror array and a fourth micromirror array" (claim 13) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: element 140. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly labeled as "Annotated Sheets" and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37 CFR 1.121(d)(1). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

***Specification***

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-3, 6, 8-10, 12-13 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Marshall et al.

Lin (US Patent Number 6,089,719) discloses:

- Regarding claims 1, 13 and 18, an optical system (Figure 2, element 40) and the method for said optical system comprising a first micromirror array (Figure 2, element 44; wherein element 44 comprises a DMD; column 3, lines 35-36 and column 3, lines 42-44), a second micromirror array (Figure 2, element 46; wherein element 46 comprises a DMD; column 3, lines 35-36 and column 3, lines 42-44); a ray-forming device (Figure 2, element 40), wherein the ray-forming device separates a light image into image components (column 3, lines 45-50), wherein a first image component is received by the first micromirror array (i.e. light emitted from the

illumination device received by element 44; column 3, lines 5-11), a second image component is received by the second micromirror array (i.e. light emitted from the illumination device received by element 46; column 3, lines 5-11), a third image component sent from the first micromirror array (i.e. light emitted from element 44) and a fourth image component sent from the second micromirror array (i.e. light emitted from element 46) are combined at the ray-forming device (Figure 2, element 50) to produce a composite image (i.e. an output light beam; column 3, lines 12-18).

- Regarding claim 2, the ray-forming device (Figure 2, element 50) is a beam splitter (column 2, line 63).
- Regarding claim 8, the ray-forming device (Figure 2, element 50) further comprises transparent surfaces and reflective surfaces (column 4, lines 14-17).
- Regarding claims 9 and 20, the composite image is displayed (column 3, lines 19-22).
- Regarding claim 10 and 19, the composite image is projected (column 4, lines 6-7).
- Regarding claim 12, the first image component (i.e. light emitted from the illumination device received by element 44; column 3, lines 5-11) and the second image component (i.e. light emitted from the illumination device received by element 46; column 3, lines 5-11) are produced by the system of mirrors (column 3, lines 35-36).

Lin teaches the salient features of the present invention as explained above, except (regarding claims 1 and 13) a micromirror array comprising micromirrors and non-mirrored regions; (regarding claims 3 and 8) wherein the micromirrors and the non-mirrored/transparent surfaces regions of the first micromirror array are alternately disposed in a checkerboard-like arrangement; (regarding claim 6) the micromirrors are square in shape.

Marshall et al. (US Patent Number 6,406,148 B1) discloses a micromirror array (Figure 5; i.e. optical shutter) comprising micromirrors (Figure 5, "on" element) and non-mirrored regions (Figure 5, "off" element); wherein the micromirrors (Figure 5, "on" element) and the non-mirrored/transparent surfaces regions (Figure 5, "off" element) of the first micromirror array are alternately disposed in a checkerboard-like arrangement (see Figure 5); the micromirrors are square in shape (i.e. shape of the "on" element from Figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the micromirror array disclosed by Marshall et al. in substitution of the micromirror array from Lin's invention, for the purpose of reducing the illumination intensity during a given period (Marshall et al., column 3, lines 23-26).

7. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon et al. in view of Marshall et al.

Gibbon et al. (US Patent Number 6,582,080 B2) discloses:

- Regarding claim 21, a control (Figure 2, element 38) and support region (Figure 2, elements 36), one of a plurality of control (Figure 2, element 38)

and support regions (Figure 2, elements 36), one for each of the plurality of micromirrors (column 3, lines 59-61), wherein each control and support region comprising a micromirror support post (Figure 2, element 36), support circuitry (Figure 2, element 35), and pads (Figure 2, element 40); wherein the micromirror support post (Figure 2, element 36) is disposed beneath the micromirror (Figure 2, element 34) while the support circuitry (Figure 2, element 35) and the pads (Figure 2, element 40) are disposed beneath the non-mirrored surface (i.e. pads under the mirror 34, see Figure 2).

- Regarding claim 22, the micromirror is square in shape (square shape of element 34, see Figure 2).

Gibbon et al. teaches the salient features of the present invention as explained above, except a micromirror wherein the micromirror is part of a plurality of micromirrors which are alternately disposed with the non-mirrored surfaces in a checkerboard-like pattern.

Marshall et al. (US Patent Number 6,406,148 B1) discloses a micromirror (Figure 5; i.e. optical shutter) wherein the micromirror is part of a plurality of micromirrors (Figure 5, "on" element), which are alternately disposed with the non-mirrored surfaces (Figure 5, "off" element) in a checkerboard-like pattern (see Figure 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the micromirror array disclosed by Marshall et al. in substitution of the micromirror array from Gibbon et al.'s invention, for the purpose of



reducing the illumination intensity during a given period (Marshall et al., column 3, lines 23-26).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Marshall et al. as applied to claims 1-3, 6, 8-10, 12-13 and 18-20 above, and further in view of Gibbon et al.

Lin (US Patent Number 6,089,719) in combination with Marshall et al. (US Patent Number 6,406,148 B1) teaches the salient features of the present invention as explained above, except a micromirror comprising a control and support region comprising at least a mirror support post, support circuitry, and pads, wherein the mirror support post is disposed beneath the micromirror, but the support circuitry and pads are disposed beneath a non-mirrored region adjacent to the micromirror.

Gibbon et al. (US Patent Number 6,582,080 B2) discloses a micromirror (Figure 2, element 34) comprising a control (Figure 2, element 38) and support region comprising at least a mirror support post (Figure 2, element 36), support circuitry (Figure 2, element 35), and pads (Figure 2, element 40), wherein the mirror support post (Figure 2, element 36) is disposed beneath the micromirror (Figure 2, element 36), but the support circuitry (Figure 2, element 35) and pads (Figure 2, element 40) are disposed beneath a non-mirrored region adjacent to the micromirror (i.e. pads and support circuitry located under the mirror 34, see Figure 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the micromirror disclosed by Gibbon et al. in substitution with the micromirrors from Lin's invention, for the purpose of individually controlling

each DMD to impart appropriate image information to the light beam (Gibbon et al., column 3, lines 41-43).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Marshall et al. as applied to claims 1-3, 6, 8-10, 12-13 and 18-20 above, and further in view of Robinson et al.

Lin (US Patent Number 6,089,719) in combination with Marshall et al. (US Patent Number 6,406,148 B1) teaches the salient features of the present invention as explained above, except micromirrors in circular shape.

Robinson et al. (US Patent Number 6,031,657) discloses micromirrors in circular shape (Figure 1, element 14).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the circular micromirrors disclosed by Robinson et al. in substitution of the micromirrors from Lin's invention, for the purpose of improving the field uniformity seen by each micromirror (Robinson et al., column 4, lines 65-66).

10. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Marshall et al. as applied to claims 1-3, 6, 8-10, 12-13 and 18-20 above, and further in view of Daniele et al.

Lin (US Patent Number 6,089,719) in combination with Marshall et al. (US Patent Number 6,406,148 B1) teaches the salient features of the present invention as explained above, except a birefringent crystal.

Daniele et al. (US Patent Number 4,733,252) discloses a beam splitter composed of a birefringent crystal (column 2, lines 16-17).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the birefringent crystal disclosed by Daniele et al. in substitution of the beam splitter from Lin's invention, for the purpose of modulating each beam in accordance with separate input signals (Daniele et al., column 2, lines 42-44).

11. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon et al. in view of Marshall et al. as applied to claims 21-22 above, and further in view of Robinson et al.

Gibbon et al. (US Patent Number 6,582,080 B2) in combination with Marshall et al. (US Patent Number 6,406,148 B1) teaches the salient features of the present invention as explained above, except micromirrors in circular shape.

Robinson et al. (US Patent Number 6,031,657) discloses micromirrors in circular shape (Figure 1, element 14).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the circular micromirrors disclosed by Robinson et al. in substitution of the micromirrors from Gibbon et al.'s invention, for the purpose of improving the field uniformity seen by each micromirror (Robinson et al., column 4, lines 65-66).

#### ***Allowable Subject Matter***

12. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claims 14-17 are allowed.
14. The following is a statement of reasons for the indication of allowable subject matter:
  - a. Regarding claim 4, the prior art or record neither shows nor suggests an optical system wherein the second micromirror array is complementary to the first micromirror array.
  - b. Regarding claim 14, the prior art or record neither shows nor suggests an optical system comprising a first microshutter array, having transparent and opaque regions; and a second microshutter array, comprising transparent and opaque regions.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


Ciacchi et al. (US Patent Number 6,575,576 B1) discloses a method and apparatus for increasing the spatial resolution of a projected pixelated display.

Long et al. (US Patent Number 6,767,100 B1) teaches a system and method employing reflective imaging devices for a projection display.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Magda Cruz whose telephone number is (571) 272-2114. The examiner can normally be reached on Monday through Thursday 8:00-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Nguyen can be reached on (571) 272-2258. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Magda Cruz  
Patent Examiner  
Art Unit 2851

July 23, 2005